

REMARKS

Claims 1-6 are presently pending in the application.

Claim 1 has been amended to recite that the total amount of cerium oxide or rare earth element and one or more elements is from 15% to 35% by mass, which is supported in the specification at least in Table 1 and in paragraphs [0027] and [0029]. Claim 6 has been added, which recites that the support is calcined at a temperature of 700°C to 1200°C. Claim 6 is supported in the specification at least in paragraph [0035]. No new matter has been added by these amendments, and entry is respectfully requested.

In the Office Action, the Examiner has rejected claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,436,363 of Hwang ("Hwang"). The Examiner argues that Hwang discloses a process for producing hydrogen comprising introducing a preheated stream of hydrocarbon, water, and air to an autothermal reactor containing a layered catalyst. Hwang allegedly discloses that the catalyst layer may contain ruthenium and a rare earth oxide on an aluminum oxide support. The Examiner acknowledges that Hwang does not disclose the claimed specific amounts and ratios of the elements, but contends that it would have been obvious to determine suitable or optimum amounts and ratios of the catalytic elements since it would have been expected that these amounts and ratios would be result-effective variables for the process of Hwang. The Examiner takes the position that the steam reforming catalyst layer of Hwang is present in the autothermal reforming section, and thus is considered to constitute an autothermal reforming catalyst. Applicants respectfully traverse this rejection and the argument in support thereof as follows, and respectfully request reconsideration and withdrawal of the rejection.

The activity of the inventive catalyst is superior to that of conventional catalysts due to the specific combination of several features. For example, the total amount of cerium oxide or cerium-containing rare earth element oxide and alkaline metal or alkaline earth metal is 15 to 35% by mass, and the atomic ratio of Ce to Ru is 1 to 250. As shown in Table 1 of the application, catalysts which do not contain these features (in which the total mass percent of

cerium oxide/alkaline metal/alkaline earth metal is not within the claimed range and/or in which the Ce/Ru ratio is not within the claimed range) exhibit poor catalyst activity. Specifically, the conversion rates of the catalysts prepared in Comparative Examples 1 and 2 were as low as 57% and only as high as 88%, compared to the 100% conversion provided by all of the inventive catalysts prepared in Examples 1 to 10. Further, the carbon precipitation amount of the comparative catalysts was much greater (1 to 4 mass %) than for the inventive catalysts (all less than 0.1 mass %).

Hwang teaches in col. 6, lines 5-8 that the metal oxide is present in an amount of about 2 to about 10 weight %. However, Hwang does not teach or suggest that the support contains an alkaline or alkaline earth metal, nor that the total content of metal oxide/alkaline metal/alkaline earth metal is 15 to 35 mass percent as claimed. Accordingly, the results observed by the claimed catalyst would not have been expected based on Hwang. Since Hwang is silent as to the alkaline metal/alkaline earth metal component, determining the optimum amount of such a component cannot involve merely optimizing a result effective variable as asserted by the Examiner.

Finally, claim 6 recites that the support is calcined at a temperature of 700 to 1200°C. Hwang does not teach or suggest such a calcination step, but merely describes mixing materials to produce a support. Accordingly, the enhanced durability of the resulting catalyst which Applicants have determined will result from such a calcinations step would not have been expected based on Hwang.

For all of these reasons, all of the claimed elements are not taught or suggested by Hwang, and reconsideration and withdrawal of the 103(a) rejection are respectfully requested.

In view of the preceding Amendments and Remarks, Applicants respectfully submit that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Application No. 10/813,473

• Reply to Office Action of June 30, 2005

Respectfully submitted,

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Enclosure: Petition for Extension of Time (three months)